

ART 34 ANDT

- 17 -

CLAIMS

1. An electrokinetic method for groundwater protection, soil remediation and/or soil engineering which comprises applying an electric field between iron-rich sacrificial electrodes, which are implanted in an area of water-bearing soil, sediment or slurry, so as to generate an abrupt pH and Eh gradient from acid to alkaline conditions, with the spontaneous *in situ* precipitation of a stable iron-rich band occurring at the boundary between the acid and alkaline zones.
2. A method as claimed in claim 1, wherein the pH gradient is from pH2 to pH13.
3. A method as claimed in claim 1 or claim 2, wherein the current is applied between one or more pairs of electrodes inserted in the area of soil, sediment or slurry.
4. A method as claimed in claim 3, wherein the electrodes are made of cast iron, scrap iron, stainless steel or other iron-rich material.
5. A method as claimed in claim 3 or claim 4, wherein the voltage employed is less than 0.5 volts per cm of the distance between a pair of electrodes.
6. A method as claimed in any one of the preceding claims, wherein the soil, sediment or slurry contains organic, inorganic and/or radioactive contaminants.
7. A method as claimed in any one of the preceding claims, wherein the iron-rich band acts as a physical and/or chemical barrier to contaminants present in the soil, sediment or slurry.
8. A method as claimed in any one of the preceding claims, where iron is precipitated to form an impermeable coherent band, or a coating which cements soil/sediment particles, or a dispersed coating on mineral grains, between two or more electrodes.
9. A method as claimed in any one of the preceding claims, wherein the generation of the pH / Eh gradient mobilises, remobilises

ART 34 A34D

- 18 -

and/or traps contaminants present in the soil, sediment or slurry.

10. A method as claimed in any one of the preceding claims, which is performed for the purpose of the stabilisation and/or strategic dewatering/rewatering of soils, sediment and/or slurries, the improvement  
5 of the physical properties of soils and sediments for engineering purposes, the forced and directed migration of contaminated leachates, and/or electro-osmotic purging of non-polar contaminants.